WHAT IS CLAIMED IS:

1. An in-phase/quadrature component (IQ) mixer, said mixer configured to reject returns from a negative doppler shift swath in order to mitigate corruption of a positive doppler shift swath, said mixer comprising:

a sample delay element configured to produce a quadrature component of the returned swaths;

a plurality of mixer elements, at least one said mixer element configured to sample an in-phase component of the returned swaths at a pulse repetition interval, at least one said mixer element configured to sample the quadrature component at a pulse repetition interval;

a plurality of low pass filters electrically connected to outputs of said mixer elements, at least one said low pass filter configured to filter the in-phase component, at least one said low pass filter configured to filter the quadrature component;

a plurality of decimators electrically connected to outputs of said low pass filters, at least one said decimator configured to down sample the in-phase component to a doppler frequency, at least one said decimator configured to down sample the quadrature component to the doppler frequency;

a plurality of all pass filters electrically connected to outputs of said decimators, at least one said all pass filter configured to filter the down sampled in-phase component, at least one said all pass filter configured to filter the down sampled quadrature component; and

a subtraction element electrically connected to outputs of said all pass filters, said subtraction element configured to subtract the filtered and down sampled quadrature component from the filtered and down sampled in-phase component.

2. A mixer according to Claim 1 wherein said mixer elements are configured to sample the components at a multiple of the frequency of the input signal.

3. A mixer according to Claim 2 wherein the frequency of the input signal is 100MHz and said mixer elements are configured to sample the components of the input signal at 25MHz.

4. A mixer according to Claim 1 wherein said all pass filters comprise four cascaded second order infinite impulse response (IIR) filters.

5. A mixer according to Claim 4 wherein said second order IIR filter operate according to output = $((A0 \times input) + (A1 \times P\_in) + (A2 \times PP\_in) - (B1 \times P\_out) - (B2 \times PP\_out))/B0$, where P_in is the input from the previous sample, PP_in is the input from two samples previous, P_out is the output from the previous sample, PP_out is the output from two samples previous, and A0, A1, A2, B0, B1, and B2 are coefficients.

6. A mixer according to Claim 5 wherein a first IIR filter for an in-phase component is configured with coefficients $A2=(4.0 / T) / T + (2.0 \times w0 \times a/T) + w0 \times w0$, $A1 = (-8.0 / T) / T + 2.0 \times w0 \times w0$, $A0 = (4.0 / T) / T - (2.0 \times w0 \times a/T) + w0 \times w0$, $B2 = (4.0 / T) / T - (2.0 \times w0 \times a/T) + w0 \times w0$, $B1 = (-8.0 / T) / T + 2.0 \times w0 \times w0$, and $B0 = (4.0 / T) / T + (2.0 \times w0 \times a/T) + w0 \times w0$, where $a = 1.0 / 0.3225$, $w0 = 57.956$, and $T = 1.0$ / a base band sampling frequency.

7. A mixer according to Claim 5 wherein a second IIR filter for an in-phase component is configured with coefficients $A2 = (4.0 / T) / T + (2.0 \times w0 \times b/T) + w0 \times w0$, $A1 = (-8.0 / T) / T + 2.0 \times w0 \times w0$, $A0 = (4.0 / T) / T - (2.0 \times w0 \times b/T) + w0 \times w0$, $B2 = (4.0 / T) / T - (2.0 \times w0 \times b/T) + w0 \times w0$, $B1 = (-8.0 / T) / T + 2.0 \times w0 \times w0$, and $B0 = (4.0 / T) / T + (2.0 \times w0 \times b/T) + w0 \times w0$, where $b = 1.0 / 0.4071$, $w0 = 1198.2$, and $T = 1.0$ / a base band sampling frequency.

8. A mixer according to Claim 5 wherein a third IIR filter for an in-phase component is configured with coefficients $A2 = (4.0 / T) / T + (2.0 \times w0 \times$

c/T) + w0 × w0, A1 = (-8.0 / T) / T + 2.0 × w0 × w0, A0 = (4.0 / T) / T - (2.0 × w0 × c/T) + w0 × w0, B2 = (4.0 / T) / T - (2.0 × w0 × c/T) + w0 × w0, B1 = (-8.0 / T) / T + 2.0 × w0 × w0, and B0 = (4.0 / T) / T + (2.0 × w0 × c/T) + w0 × w0, where c = 1.0 / 0.4073, w0 = 16974.0, and T = 1.0 / a base band sampling frequency.

9. A mixer according to Claim 5 wherein a fourth IIR filter for an in-phase component is configured with coefficients A2 = (4.0 / T) / T + (2.0 × w0 × d/T) + w0 × w0, A1 = (-8.0 / T) / T + 2.0 × w0 × w0, A0 = (4.0 / T) / T - (2.0 × w0 × d/T) + w0 × w0, B2 = (4.0 / T) / T - (2.0 × w0 × d/T) + w0 × w0, B1 = (-8.0 T) / T + 2.0 × w0 × w0, and B0 = (4.0 / T) / T + (2.0 × w0 × d/T) + w0 × w0, where d = 1.0 / 0.3908, w0 = 259583.5, and T = 1.0 / a base band sampling frequency.

10. A mixer according to Claim 5 wherein a first IIR filter for a quadrature component is configured with coefficients A2 = (4.0 / T) / T + (2.0 × w0 × e/T) + w0 × w0, A1 = (-8.0 / T) / T + 2.0 × w0 × w0, A0 = (4.0 / T) / T - (2.0 × w0 × e/T) + w0 × w0, B2 = (4.0 / T) / T - (2.0 × w0 × e/T) + w0 × w0, B1 = (-8.0 / T) / T + 2.0 × w0 × w0, and B0 = (4.0 / T) / T + (2.0 × w0 × e/T) + w0 × w0, where e= 1.0 / 0.3908, w0 = 152.05, and T = 1.0 / a base band sampling frequency.

11. A mixer according to Claim 5 wherein a second IIR filter for a quadrature component is configured with coefficients A2 = (4.0 / T) / T + (2.0 × w0× f/T) + w0 × w0, A1 = (-8.0 / T) / T + 2.0 × w0 × w0, A0 = (4.0 / T) / T - (2.0 × w0 × f/T) + w0 × w0, B2 = (4.0 / T) / T - (2.0 × w0 × f/T) + w0 × w0, B1 = (-8.0 / T) / T + 2.0 × w0 × w0, and B0 = (4.0 / T) / T + (2.0 × w0 × f/T) + w0 × w0, where f= 1.0 / 0.4073, w0 = 2326.03, and T = 1.0 / a base band sampling frequency.

12. A mixer according to Claim 5 wherein a third IIR filter for a quadrature component is configured with coefficients A2 = (4.0 / T) / T + (2.0 × w0 × g/T) + w0 × w0, A1 = (-8.0 / T) / T + 2.0 × w0 × w0, A0 = (4.0 / T) / T - (2.0 × w0 × g/T) + w0 × w0, B2 = (4.0 / T) / T - (2.0 × w0 × g/T) + w0 × w0, B1 = (-8.0 / T) / T + 2.0 × w0 × w0, and B0 = (4.0 / T) / T + (2.0 × w0 × g/T) + w0 × w0, where g= 1.0 / 0.4071, w0 = 32949.65, and T = 1.0 / a base band sampling frequency.

13. A mixer according to Claim 5 wherein a fourth IIR filter for a quadrature component is configured with coefficients $A2 = (4.0 / T) / T + (2.0 \times w0 \times h/T) + w0 \times w0$, $A1 = (-8.0 / T) / T + 2.0 \times w0 \times w0$, $A0 = (4.0 / T) / T - (2.0 \times w0 \times h/T) + w0 \times w0$, $B2 = (4.0 / T) / T - (2.0 \times w0 \times h/T) + w0 \times w0$, $B1 = (-8.0 / T) / T + 2.0 \times w0 \times w0$, and $B0 = (4.0 / T) / T + (2.0 \times w0 \times h/T) + w0 \times w0$, where $h = 1.0 / 0.3225$, $w0 = 681178.9$, and $T = 1.0$ / a base band sampling frequency.

14. A mixer according to Claim 1 wherein said sample delay element is configured to produce a quadrature component by shifting a phase of an in-phase component by 90 degrees.

15. A method for processing radar return data in order to reject returns from a negative doppler shift swath to mitigate corruption of returns from a positive doppler shift swath, the radar receiving returns at each of a right channel, a left channel, and an ambiguous channel, said method comprising:

sampling the radar data from each of the channels;

filtering the samples;

converting the filtered samples to doppler frequency signals;

filtering the doppler frequency signals with a band pass filter, the filter centered at the doppler frequency; and

determining phase relationships between the right, left , and ambiguous channels using the filtered doppler frequency signals.

16. A method according to Claim 15 wherein converting the filtered samples to a doppler frequency comprises converting the filtered samples into in-phase and quadrature components of the returned swaths.

17. A method according to Claim 16 wherein converting the filtered samples into in-phase and quadrature components comprises applying a sample delay to phase shift an in-phase component by 90 degrees.

18. A method according to Claim 16 wherein converting the filtered samples to a doppler frequency comprises filtering the in-phase and quadrature components using four cascaded second order infinite impulse response filters.

19. A method according to Claim 18 further comprising subtracting the quadrature components from the in-phase components.

20. A method according to Claim 15 wherein sampling the radar data from each of the channels comprises sampling the components at a multiple of four of the frequency of the input signal.

21. A radar signal processing circuit comprising:

a radar gate correlator configured sample radar data at a sampling rate;

a correlation bass pass filter configured to stretch the sampled radar data to a continuous wave (CW) signal;

a mixer configured to generate a quadrature component of the CW signal using a sample delay element and further configured to down sample an in-phase component and the quadrature component of the CW signal to a doppler frequency; and

a band pass filter centered on the doppler frequency.

22. A radar signal processing circuit according to Claim 21 wherein said mixer comprises at least one all pass filter, said comprising four cascaded second order infinite impulse response filters.